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10/809,244	03/25/2004	Pankaj Gupta	NLMI.P162	6712

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SHEMWELL MAHAMEDI LLP
4880 STEVENS CREEK BOULEVARD
SUITE 201
SAN JOSE, CA 95129

EXAMINER

LOVEL, KIMBERLY M

ART UNIT	PAPER NUMBER
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2167

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/809,244

Applicant(s)

GUPTA ET AL.

Examiner

Kimberly Lovel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :8/3/04; 8/6/04; 12/6/04; 3/1/07.

DETAILED ACTION

1. Claims 1-7 are canceled.
2. Claims 8-24 are rejected.

Election/Restrictions

3. Applicant's election without traverse of Group 2 (claims 8-24) in the reply filed on 6 February 2007 is acknowledged.

Priority

4. The Applicants' claim of domestic priority under 35 U.S.C. 119(e) to provisional application 60/458,497, filed 28 March 2003 is acknowledged.

Information Disclosure Statement

5. The information disclosure statements (IDS) submitted on 3 August 2004, 6 August 2004, 6 December 2004 and 1 March 2007 were filed after the mailing date of the application on 25 March 2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Claim Objections

6. **Claims 9, 13, 18 and 24** are objected to because of the following informalities:

Claim 9 recites the limitation "the most significant bit" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 13 recites the limitation "immediately proceeding and/or encompassing" in line 4. The use of the term "and/or" causes the metes and bounds of the limitation to be unclear.

Claim 18 recites the limitation "input/output port" in line 2. The use of the term "input/output" causes the metes and bounds of the limitation to be unclear.

Claim 24 recites the limitation "the memory structure" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. **Claims 21 and 24** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding **claim 21**, the limitation "random access memory (DRAM or SRAM)" renders the claim indefinite because it is unclear whether the terms in the parentheses following the phrase "random access memory" are part of the claimed invention. See MPEP § 2173.05(d).

Regarding **claim 24**, the limitations "random access memory (DRAM or SRAM)" and "content-addressable memory (CAM or TCAM)" renders the claim indefinite because it is unclear whether the terms in the parentheses following the phrases "random access memory" and "content-addressable memory" are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. **Claims 8, 9-11 and 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No 6,018,524 to Turner et al (hereafter Turner).**

Referring to claim 8, Turner discloses a method for updating a forwarding database, comprising:

forming a hierarchical tree structure of the forwarding database [forwarding table] by splitting N number of prefixes within the database into a number of sub-databases bounded by N/T and $2N/T+1$, wherein each sub-database has no more than T number of prefixes, with T being less than N (see column 2, lines 12-13; column 4, lines 50-56; Fig 6; and Fig 7);

modifying the hierarchical tree structure in accordance with one or more update operations [insertion strategy] (see column 14, lines 42-43 and Fig 19); and

updating a portion of the forwarding database to reflect modifications made to the hierarchical tree structure, wherein the updated portion corresponds to only those sub-databases affected by the update operations [incremental algorithm done by doing the Insert algorithm for an individual prefix when a new prefix is added] (see column 17, line 60 – column 18, line 34).

Referring to claim 9, Turner discloses the method of claim 8, wherein said forming comprises, beginning with the most significant bit of the N number of prefixes, repeatedly splitting the N number of prefixes into a plurality of nodes extending between and including a root node and a plurality of leaf nodes, and wherein each of the plurality of leaf nodes corresponds to one of the sub-databases (see column 5, lines 41-62 and Fig 7).

Referring to claim 10, Turner discloses the method of claim 9, wherein said modifying comprises performing the update operations on one or more of the plurality of leaf nodes, wherein the update operations are selected from a group comprising: adding [insertion] a new prefix to the forwarding database, deleting an existing prefix from the forwarding database and modifying an existing prefix in the forwarding database (see column 14, lines 42-43; column 17, line 60 – column 18, line 34 and Fig 19).

Referring to claim 11, Turner discloses the method of claim 10, wherein said modifying comprises no further steps [no further steps are mentioned] (see column 14, lines 42-43; column 17, line 60 – column 18, line 34 and Fig 19).

Referring to claim 17, Turner discloses a lookup table stored in a computer-readable storage medium and construed in accordance with the method as recited in claim 8 (see column 7, line 44).

Referring to claim 18, Turner discloses a computer or application specific integrated circuit (ASIC) residing within a forwarding device, a line card of an input/output port of the forwarding device, or a switch fabric of the forwarding device, for

executing the method as recited in claim 8 (see column 15, lines 60-62; column 16, lines 1-10 and Fig 14).

Referring to claim 19, Turner discloses a computer readable storage medium, comprising:

a forwarding database comprising N number of prefixes split among a plurality of sub-databases, wherein each sub-database initially includes less than T number of prefixes, with T being less than N (see column 2, lines 12-13; column 4, lines 50-56; Fig 6; and Fig 7); and

an updating program that, when executed upon a processor:

(1) modifies a hierarchical tree structure in accordance with one or more update operations [insertion strategy], wherein prior to execution of the updating program, the hierarchical tree structure included a number of branches extending from a root node to a plurality of leaf nodes, and wherein each of the plurality of leaf nodes corresponds to one of the plurality of sub-databases (see column 14, lines 42-43 and Fig 19); and

(2) updates a portion of the forwarding database to reflect modifications made to the hierarchical tree structure, wherein the updated portion corresponds to only those sub-databases affected by the update operations [incremental algorithm done by doing the Insert algorithm for an individual prefix when a new prefix is added] (see column 17, line 60 – column 18, line 34).

Referring to claim 20, Turner discloses the computer readable storage medium of claim 19, wherein the computer readable storage medium is directly coupled to, or incorporated within, the processor, and wherein at least a portion of the sub-database at each leaf nodes is contained within respective portions of the computer readable storage medium (see column 15, lines 60-62; column 16, lines 1-10 and Fig 14).

Referring to claim 21, Turner discloses the computer readable storage medium of claim 20, wherein the computer readable storage medium comprises random access memory (see column 15, lines 60-62; column 16, lines 1-10 and Fig 14).

Referring to claim 22, Turner discloses the computer readable storage medium of claim 20, wherein the updating program is stored within the computer readable storage medium, along with the forwarding database, or within a memory structure indirectly coupled to the processor (see column 15, lines 60-62; column 16, lines 1-10 and Fig 14).

Referring to claim 23, Turner discloses the computer readable storage medium of claim 22, wherein a copy of the forwarding database is stored within the memory structure (see column 7, line 44).

Referring to claim 24, Turner discloses the computer readable storage medium of claim 20, wherein, the memory structure comprises one or more of a random access memory (DRAM or SRAM), a content-addressable memory (CAM or TCAM), or a network search engine (TNSE) (see column 5, lines 18-31).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No 6,018,524 to Turner et al as applied to claim 10 above, and further in view of US Patent No 6,735,600 to Andreev et al (hereafter Andreev).

Referring to claim 12, Turner discloses modifying the tree structure, however, Turner fails to explicitly disclose the further limitations of splitting a leaf node or merging a leaf node. Andreev discloses modifying a tree structure by inserting and deleting entries (see abstract and column 3, lines 43-52), including the further limitation wherein said modifying further comprises one or more of the following steps:

splitting a leaf node, which has been modified to include more than T number of prefixes, into at least one additional pair of leaf nodes, each having less than T number of prefixes (see column 3, lines 52-58); and

merging a leaf node, which has been modified or split to include fewer than a minimum number of prefixes, with a parent node arranged closer to the root node than the leaf node having fewer than the minimum number of prefixes (see column 3, lines 59-65) in order to decrease the time it takes to update a tree during insertion or deletion.

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the steps of splitting and merging the nodes of the tree structure as

disclosed by Andreev to modify the tree structure if Turner. One would have been motivated to do so in order to decrease the time it takes to update a tree during insertion or deletion since lookup procedures are a major source of bottlenecks in high-performance routers (see Andreev: column 1, lines 25-30).

Referring to claim 13, the combination of Turner and Andreev (hereafter Turner/Andreev) discloses the method of claim 12, wherein said merging is performed only if:

the total number of nodes in the hierarchical tree structure is equal to or greater than $2N/T+1$; or

the total number of nodes in the hierarchical tree structure falls within a predetermined range of values immediately preceding and/or encompassing the value represented by $2N/T+1$; or

a predetermined time period has passed, in which no merging was performed (see column 3, lines 54-58; column 4, lines 37-52; and column 7, line 28 – column 8, line 7).

Referring to claim 14, Turner/Andreev discloses the method of claim 13, wherein said merging further comprises repeatedly merging the leaf node and the parent node up towards the root node, if the number of prefixes within the leaf node, the parent node and any subsequently merged parent nodes remains less than the minimum number of prefixes (see column 7, lines 28 – column 8, line 7).

Referring to claim 15, Turner/Andreev discloses the method of claim 12, wherein said merging is performed only if no other node exists below the parent node

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that can be paired with the leaf node, such that the combined number of prefixes within the leaf node and the other node is greater than T (see column 3, lines 54-58; column 4, lines 37-52; and column 7, line 28 – column 8, line 7).

Referring to claim 16, Turner/Andreev discloses the method of claim 15, wherein, said merging is performed no more than one time (see column 3, lines 54-58; column 4, lines 37-52; and column 7, line 28 – column 8, line 7).

Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Lovel whose telephone number is (571) 272-2750. The examiner can normally be reached on 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on (571) 272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kimberly Lovel
Examiner
Art Unit 2167

28 April 2007
kml


JOHN COTTINGHAM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100